

PART II: BACKGROUND

Chapter 1: Louisiana Resources

Louisiana Geography and Climate

Louisiana lies entirely in the Gulf Coastal Plain physiographic province and can be divided into five natural physiographic regions: Coastal Marsh, Mississippi Alluvial Valley, Red River Valley, Terraces, and Hills. The state has twelve major river basins, which are described in Appendix F. Maximum elevations in Louisiana are located in the hills of the northwest, where the state's oldest geologic formations are found. The highest elevation in the state is only 535 feet. The lowest elevations in the state are found in the Coastal Marsh area, which extends across the southern portion of Louisiana and represents a valuable fisheries and wildlife resource. Due to levee construction, marsh filling, and subsidence, portions of south Louisiana are below sea level. Because Louisiana's coastal resources differ significantly in physical, chemical, and hydrological characteristics from upland resources, the atlas information provided below for lakes and wetlands has been broken down into two categories: inland and coastal. Those categorized as coastal receive some tidal influx, even though some of the coastal lakes and wetlands are characterized by fresh water vegetation.

Louisiana has a humid subtropical climate that is influenced by the extensive landmass to the north, the Gulf of Mexico to the south, and the subtropical latitude. Prevalent winds from the south/southeast bring in warm, moist air from the Gulf, resulting in abundant rainfall. The statewide annual average precipitation varies from 48 inches in the northwestern part of the state near Shreveport to 64 inches in the southeastern coastal plains near Thibodaux.

Louisiana Resources Atlas

State Population (1993 Estimate)	4,295,0000	
State Surface Area (Land)	44,521	square miles
Percent Land	93%	
State Surface Area (Water)	3,100	square miles
Percent Water	7%	
Major Water Basins	12	

Rivers:

Total River Miles	66,294	miles
Perennial	32,955	miles
Intermittent	20,667	miles
Ditches/Canals	12,672	miles

Border Miles:

Names and Mileage of Border Rivers

Total Mileage	484	miles
Pearl River	74	miles
Mississippi River	200	miles
Sabine River (includes Toledo Bend Reservoir)	210	miles

Lakes:

Total Number of Fresh water Lakes/Reservoirs	6,603	
Total Acres of Fresh water Lakes/Reservoirs	1,078,031	acres
Number of Inland Fresh water Lakes/Reservoirs > 1 sq. mi.	62	
Acres of Inland Fresh water Lakes/Reservoirs > 1 sq. mi.	474,506	acres
Number of Coastal Fresh water Lakes/Reservoirs	39	
Acres of Coastal Fresh water Lakes/Reservoirs	239,213	acres

Wetlands:

Fresh Water Inland Wetlands	3,000,130	acres
Tidal Wetlands	2,550,821	acres
Swamp (Coastal)	392,109	acres
Fresh Marsh (Coastal)	533,577	acres
Intermediate	441,046	acres
Brackish Marsh	820,378	acres
Salt Marsh	363,711	acres

Estuaries/Bays: 7,656 square miles

Coastal Miles: 397 miles

Total Miles of Shoreline: (includes islands, bays, rivers and bayous up to head of tide water) 7,721 miles

Summary of Classified Uses

Table 2.1.1

Total sizes of Louisiana water bodies classified for various designated uses (Louisiana Environmental Regulatory Code 33:IX.1123).

Classified Uses	Water Body Type			
	River (miles)	Lakes (acres)	Estuaries (sq. miles)	Wetlands (acres)
Primary contact recreation	9,360	660,284	4,953	1,025,280
Secondary contact recreation	9,477	660,284	4,953	1,036,288
Fish and wildlife propagation	9,447	660,284	4,953	1,036,288
Drinking water supply	1,311	251,717	-0-	464,000
Oyster propagation	547	-0-	4,268	-0-
Agriculture	2,041	425,998	-0-	-0-
Outstanding natural resource	1,587	-0-	-0-	-0-
Limited aquatic life and wildlife	30	-0-	-0-	-0-

Chapter 2: Water Pollution Control Program

Watershed Approach

LDEQ reports on water quality in the state by basin subsegment. Louisiana is divided into 12 major watershed basins, and each basin is further divided into water body subsegments. This subsegment approach divides the state's waters into discrete hydrologic units. The plan for this approach was presented in the 1978 Water Quality Management Plan, and underwent a major revision in 1985 to increase hydrologic consistency within each named subsegment. The final draft of the Louisiana Basin Subsegment plan was completed in 1990, and is reviewed periodically to ensure that subsegments are distinct and consistent representations of the state's hydrology. The water body subsegment system within each watershed basin provides a workable framework to evaluate the state's waters. Subsegments are periodically added or removed as water quality standards related to a subsegment or group of subsegments are revised.

Water Quality Standards Program

General Overview

Louisiana's water quality standards program is based upon and authorized by §303(c) of the 1972 Federal Water Pollution Control Act (FWPCA, 1972) and its more recent amendments. Section 303(c) outlines the basic approach to developing and maintaining appropriate state water quality standards. Some of the important provisions of §303(c) are:

1. A water quality standard is defined as the designated beneficial uses of a water segment plus water quality criteria to support those uses.
2. A minimal list of designated uses including public water supply, propagation of fish and wildlife, recreation, agricultural uses, industrial uses, and navigation is outlined.
3. State standards must protect the public health and welfare, enhance the quality of the water, and "serve the purposes of the Clean Water Act¹" (CWA).
4. The States must review their standards at least once every three years using a public participation process.
5. The U.S. EPA has oversight over the state standards process. If and when a state's standards are not consistent with the applicable requirements of the CWA, the U.S. EPA may impose federal standards.

Louisiana's water quality standards are described in Chapter 11, Part IX of the Louisiana Environmental Regulatory Code, Louisiana Administrative Code, ERC 33:IX.1101 et seq., as amended. These standards: protect and preserve the natural resources of Louisiana's aquatic ecosystems; protect public health and welfare; protect or enhance the quality of waters for their designated uses; and serve the objectives of the Louisiana Water Control Law and the CWA. They are applicable to surface waters of the state and are used in permit processes as the basis for effluent limitations for point source discharges. Water quality standards are also used in the assessment process to determine if a water body is meeting its designated uses. Louisiana's water quality standards include:

1. A designated use or uses for waters of the state.
2. Water quality criteria for these waters based on their uses.
3. An antidegradation policy.

1. "Serve the purposes of the Clean Water Act" means to include provisions for restoring and maintaining the chemical, physical, and biological integrity of State waters, and, wherever attainable, achieve a level of water quality for the protection and propagation of fish, shellfish and wildlife, and recreation 'in and on' the water.

There are eight designated uses for Louisiana waters. These are primary contact recreation, secondary contact recreation, fish and wildlife propagation, drinking water supply, oyster propagation, agriculture, outstanding natural resource water, and limited aquatic life and wildlife.

Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of water supporting a particular designated use. When criteria are met, water quality will protect the designated use. Louisiana has general and numeric criteria in §1113 of Chapter 11. General criteria are expressed in a narrative form (in concise statements) and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations (weight measured per liter) or scientific units and include pH, chlorides, sulfates, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances. Specific toxic substances are those for which U.S. EPA has published national criteria recommendations. While states generally use U.S. EPA guidance and recommendations in developing and adopting their own criteria, they are allowed the flexibility to develop their own methodology as well. U.S. EPA guidance is under continuous development and revision. States will review and incorporate these developments and revisions into their water quality standards as appropriate.

Human health criteria provide guidelines that specify the potential risk of adverse effects to humans due to substances in the water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Categories of criteria are then developed for each toxic substance for public drinking water supply, non-drinking water (swimming), and non-swimming water. The basic formulas used by Louisiana come from a Federal Register notice published in 1980 (45 FR 79318).

Aquatic life criteria are designed to protect all aquatic life, including plants and animals. There are two types of criteria: “acute”, which cover short-term exposures such as spills, and “chronic”, which cover long-term or permanent exposures. One or both of the acute and chronic criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are developed for fresh and salt waters. The federal water quality standards regulations allow states to develop numerical criteria or modify U.S. EPA’s recommended criteria to account for site-specific or other scientifically defensible factors. The guidance, developed by U.S. EPA, for deriving water quality criteria is contained primarily in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Life*, published in October 1985, available from the National Technical Information Source (NTIS) publication number PB85-227049 (NTIS, 1985).

Listings of specific toxic criteria for human health and aquatic life for Louisiana are found in Table 1 of §1113 (ERC 33:IX.1113). The development of national aquatic life and human health criteria is a dynamic process that must consider the best defensible scientific information available.

Use Attainability Analyses (UAAs)

Section 101(a)(2) of the CWA states it is the National goal that “wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be attained...” To achieve the National goal, all Louisiana streams were originally assigned designated uses that were applied statewide. Criteria to support the designated uses were also assigned statewide in response to federal regulations promulgated to achieve CWA goals. Since that time, both state and federal agencies have recognized the need to establish more site-specific standards, i.e., designated uses and the criteria to support them.

Federal and state regulations provide a mechanism for change to a designated use and or supporting criteria when that use or criteria is unattainable (40 CFR §131.10, ERC 33:IX.1109.B.3). The mechanism for change is a Use Attainability Analysis (UAA). UAAs are conducted to determine the uses and criteria an individual water body can attain. According to the regulations, a UAA is defined as a “structured scientific

assessment of the factors affecting the attainment of a use that may include physical, chemical, biological, and economic factors” (See also 40 CFR §131.3(g) and ERC 33:IX.1105). The UAA process entails the methodical collection of data that is scientifically analyzed, summarized and used to make recommendations for site-specific uses and the criteria to support them. Designated uses or criteria that are not existing uses or criteria may be removed from water bodies if a UAA demonstrates the designated use or criteria has not been attained, is prevented from being attained, or is not feasible to attain for any one of six reasons found in ERC 33:IX.1109.B.3.a-f. Acceptable methods used in conducting the UAA process are more thoroughly described in U.S. EPA guidance documents (See also 40 CFR §131.10 and ERC 33:IX.1109.B.3).

UAAs for site-specific criteria and uses may be developed for a specific water body or for a watershed. In Louisiana, some water bodies have natural characteristics or physical limitations that prevent attainment of certain water quality criteria and uses. These water bodies may qualify for an excepted use classification (ERC 33:IX.1109.C). LDEQ has developed excepted use categories in the water quality standards and Water Quality Management Plan for intermittent streams, man-made water bodies, and naturally dystrophic waters. As with the development of site-specific UAAs, proposed uses and criteria based on any of the excepted use categories also require a UAA. To date, 44 water bodies in Louisiana have criteria and uses assigned to them based on UAAs approved by U.S. EPA. The U.S. EPA must approve any revisions to the water quality standards, uses, or criteria before they are implemented.

UAAs typically include historical and current data and information gathered from existing sources. When existing data are insufficient, LDEQ will conduct additional physical, chemical, and/or biological sampling at sites where designated uses and/or criteria changes are being considered. Frequently this type of site-specific data collection is performed in conjunction with LDEQ’s TMDL program intensive survey work.

Louisiana’s Nutrient Criteria Development Strategy

In 1998, the Office of the President announced “The Clean Water Action Plan” that included a requirement for states to develop and adopt numerical nutrient criteria. LDEQ has been working with U.S. EPA Region 6 toward accomplishing this goal. It has been recognized that a “one size fits all” criteria for nutrients will not be appropriate, and that each state’s nutrient criteria will need to be water body specific and fit within an appropriate ecoregion framework.

U.S. EPA has published numeric nutrient criteria recommendations for several national ecoregions. These recommendations were developed using a statistical methodology, primarily percentiles. In November 2001, U.S. EPA issued further guidance in the form of a memorandum that clarified the flexibility states have in their development of defensible nutrient criteria, and extended the deadline for states to have a “mutually-agreed upon” nutrient criteria development plan to U.S. EPA by December 2004.

LDEQ evaluated the nutrient data and criteria recommendations published using EPA’s methodology and has concluded that the methodology is not entirely suitable for Louisiana’s water bodies. LDEQ is now evaluating how to proceed with developing scientifically defensible and appropriate criteria for Louisiana’s water bodies. In this regard, LDEQ is working closely with the academic community and the U.S. Geological Survey (U.S. GS) to incorporate the latest scientific research in developing defensible approaches to nutrient criteria development. LDEQ also continues public outreach efforts to educate, inform and seek input from stakeholders about nutrient criteria development for Louisiana water bodies. LDEQ is in the process of updating the “Nutrient Criteria Development Plan” submitted to U.S. EPA-6 in December 2001, in accordance with U.S. EPA’s latest memo and guidance. More information on the National Nutrient Strategy is available at <http://www.epa.gov/ost/standards/nutrient.html>

Point Source Control Program

Introduction

Louisiana's water pollution control program is carried out through the Louisiana Department of Environmental Quality (LDEQ). LDEQ operates to preserve the integrity of the State's waters through the use of various point and nonpoint source programs. Following the reengineering of LDEQ, the responsibility for these programs is dispersed among the major offices of the department. These include the Office of Management and Finance (Municipal Facilities Revolving Loan Program), the Office of Environmental Services (municipal and industrial wastewater discharge permitting, and water quality certification program), the Office of Environmental Compliance (surveillance and enforcement of permit requirements and pollution control regulations, investigation of complaints and spills), and the Office of Environmental Assessment (regulation development, water quality assessment, review and recommendation of standards and nonpoint source programs). Brief descriptions of the various facets of the water pollution control program not already discussed above along with recent activities are provided in the following sections.

Municipal Facilities Revolving Loan Fund

The Municipal Facilities Revolving Loan Fund Program provides financial assistance for the construction of projects to enhance and improve water quality in Louisiana. Loans are below market rate, and may be used for water quality improvement projects in Louisiana communities.

Monies for the Revolving Loan Program originated with the 1987 amendments to the Clean Water Act. A new authority was created, allowing U.S. EPA to make grants to capitalize State Water Pollution Control Revolving Funds. On the state level, R.S. 30:2011(D)(4), R.S. 30:2074(A)(4) and (B)(6), and R.S. 30:2078 provided for the establishment of the Municipal Facilities Revolving Loan Fund and provision for the required twenty percent state matching funds.

Loans are made for no longer than 20 years and may be repaid through sales taxes, user fees, *ad valorem* taxes or a combination of funds. Interest payments on the amount drawn begins within six months of the loan closing and is billed every six months until the loan is paid in full. After a two-year construction period loan recipients begin repayment of principal to LDEQ. That money is then available for loans to other communities. Thus, the revolving loan fund will be a permanent source of funds for Louisiana municipalities.

As of December 2003, the U.S. EPA, through LDEQ, has awarded \$234,933,068 in fund capitalization grants to Louisiana. With the required 20% state match of \$46,986,614, less 4% for administration fees, makes \$272,522,359 available for loans to communities. As of this date, seventy-two loans to communities totaling \$341,671,178 have been closed. Another seventeen requests for loans have been received and are in the application process.

Wastewater Discharge Permits

Wastewater permits are official authorization developed and promulgated by the Office of Environmental Services of LDEQ. The LPDES (Louisiana Pollutant Discharge Elimination System) permit establishes the wasteload content of wastewaters discharged into waters of the state. The permitting process allows the state to control the amounts and types of wastewaters discharged into its surface waters. A permit is required for every point source discharge into waters of the state of Louisiana. In 1996 LDEQ assumed responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the U.S. EPA. U.S. EPA retained responsibility for the sewage sludge disposal program, municipal separate storm sewer system, and authority for offshore discharges past the 3-mile territorial seas limit. From January 2002 to December 2003, the following permits were prepared:

State Permit	Number of Permits
Minor Sanitary	93
Major Sanitary	47
Minor Industrial	328
Major Industrial	57
Major MS4 ¹	4
Stormwater General	1,008
Non-Stormwater General	2,216
Totals	3,753

¹Major Municipal Stormwater Permits

Surveillance Compliance Assurance Inspections

Municipal, industrial, federal, and agricultural point source dischargers are monitored to verify compliance with permitted effluent limitations and compliance schedules. Major dischargers are inspected annually (with sampling on approximately one-third of the dischargers) to ensure compliance with applicable effluent limitations and LPDES permit requirements. The information derived from this program can also be applied to the interpretation of state water quality data and can be used as input to water quality plan development. The types of compliance inspection activities undertaken by the Surveillance Section that are reported here include:

1. Compliance Evaluation Inspections (CEI): Non-sampling inspections designed to verify permittee compliance with applicable LPDES/state permit requirements and compliance schedules.
2. Compliance Sampling Inspections (CSI): Samples of the influent and/or effluent are collected and analyzed to determine permit compliance, in addition to the inspection activities performed in the CEIs.

The following reported numbers do not include complaint or spill related inspections. The following compliance inspection activities were conducted from January 2002 through December 2003.

Inspection Type	Number of Inspections
Compliance Evaluation Inspections	4,368
Compliance Sampling Inspections	719
Total Compliance Inspections	5,087

Surveillance Complaint Investigations

The Surveillance Division of the Office of Environmental Compliance received 7,891 environmental complaints across all media during the calendar years 2002 and 2003. Each complaint requires an incident report form and an investigation. If action is deemed necessary following the initial investigation, the investigator refers the situation to the appropriate division for enforcement action, permit action, or remedial action. Complaints include reports of oil spills, chemical spills, fish kills, unusual coloring in a stream, and illegal discharges.

Spill notifications and environmental complaints are made to the Single Point of Contact (SPOC). Notifications of emergencies are reported to the Louisiana State Police (LSP). LSP then notifies the LDEQ staff person on-call. Non-emergency conditions are reported to the LDEQ Hotline or directly to the SPOC if during normal business hours.

Notification Type	Number of Notifications
Complaint Notifications	7,891
Spill Notifications	9,511
Total	17,402

Water Quality Certification

Water quality certification is an activity of the Office of Environmental Services (OES) (Permits Division, Registrations and Certifications Section) of LDEQ. Certification is required for any activity that results in a discharge or a potential change to the waters of the state, including land clearing and drainage of agricultural lands, coastal use, certain highway construction and sewage collection projects, and bridge construction. Section 401 of the CWA requires water quality certification for all §402 (National Pollutant Discharge Elimination System) or §404 (dredge/fill) permits and, therefore, applies to both point source and nonpoint source discharges. Through the certification process, the OES is involved in the review of all environmental impact statements in order to assess potential impacts of any proposed project on waters of the state. From October 2002 to October 2003, 717 water quality certifications were issued by LDEQ.

Enforcement

The enforcement activities of the Office of Environmental Compliance (OEC), Enforcement Section are designed to ensure that all water quality standards, rules, and regulations are handled in a rapid and consistent manner. To prevent pollution of the waters of the state and to ensure remediation in the event of pollution, the Enforcement Section coordinates its enforcement activities with other sections in LDEQ, especially the Permits Section in the OES and the Surveillance Section of the OEC. Field investigations, file reviews, permit non-compliances and reviews of discharge monitoring reports (DMRs) are all used to initiate enforcement actions. The Enforcement Section initiates all formal enforcement actions and follows the actions through all appropriate levels to ensure full compliance with state laws and regulations. LDEQ seeks to provide a clean, healthy environment through protection of the state's water resources by the reduction of pollution, education of the public, and consistent, open and accountable application of standards, rules and regulations. Between August 2002 and December 2003, the following activities were recorded:

Enforcement Actions	Number
Notice Of Corrected Violations	19
Compliance Orders (CO) ¹	374
Notice of Potential Penalty (NOPP)	14
Administrative Orders	9
Penalties	19
Settlement Agreements	15

¹Includes CO and Consolidated CO/NOPP

Penalties	Dollar Value
Penalties Issued	\$652,702
Penalties Paid	\$297,168
Penalties Appealed	\$240,809
Payments From Settlement Agreements	\$4,214,250
Total Value of BEPs ²	\$10,944,000

²Beneficial Environmental Projects

Nonpoint Source Control Program

Introduction

As the State of Louisiana continues to make progress in controlling the types of pollution that are associated with point sources, more emphasis continues to be placed on identifying and controlling the types of pollution associated with nonpoint sources. These remaining water quality problems have been associated with storm water runoff from land-use activities, which transport sediments, nutrients, metals, organic material and bacteria into water bodies throughout the state. This type of pollution is called *nonpoint source pollution*. The types of land-use activities that have been identified as contributing to

nonpoint source pollution (NPS) include: **agriculture, forestry, urban, home sewage systems, construction, hydromodification, and resource extraction (sand and gravel mining).**

For purposes of implementing NPS pollution provisions in the CWA, the U.S. EPA defines NPS pollution as follows:

NPS pollution is caused by diffuse sources that are not regulated as point sources and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological and radiological integrity of water. In practical terms, NPS pollution does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation. It must be kept in mind that this definition is necessarily general; legal and regulatory decisions have sometimes resulted in certain sources being assigned to either the point or nonpoint source categories because of considerations other than their manner of discharge. For example, Section 402(l) of the Clean Water Act designates irrigation return flows as “nonpoint sources”, even though the discharge is through a discrete conveyance.

Section 319 of the Clean Water Act

Section 319 of the Clean Water Act was enacted to specifically address problems related to NPS pollution. The objective of the Act was to restore and maintain the chemical, physical and biological integrity of the nation's waters. It mandated the Nonpoint Source Management Program (LDEQ, 1987), which instructed the governor of each state to prepare and submit a program for control and reduction of NPS pollution from nonpoint sources into navigable waters within the state by implementation of a four-year management plan. In response to this federal law, the state of Louisiana passed Revised Statute 30:2011, signed by the governor in 1987 as Act 272. This law directed the LDEQ, designated as the lead agency for the NPS program, to develop and implement a NPS Management Program. The NPS Management Program was developed to facilitate coordination with appropriate state agencies including, but not limited to, the Louisiana Department of Natural Resources (LDNR), the Louisiana Department of Wildlife and Fisheries (LDWF), the Louisiana Department of Agriculture and Forestry (LDAF), and the state Soil and Water Conservation Committee, in those areas pertaining to their respective jurisdictions.

Nonpoint Source Assessment

Section 319(a) requires that states prepare a Nonpoint Source Assessment Report, which includes the following elements: (All references to sections, paragraphs and subparagraphs are from CWA §319.)

1. An identification of those navigable waters within the state which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of the CWA;
2. An identification of those categories and subcategories of nonpoint sources which add significant pollution to each portion of the navigable waters identified under subparagraph (A) in amounts which contribute to such portion not meeting such water quality standards or such goals and requirements;
3. A description of the process, including intergovernmental coordination and public participation, for identifying best management practices and measures to control each category and subcategory of nonpoint sources and, where appropriate, particular nonpoint sources identified under subparagraph (B) and to reduce to the maximum extent practicable the level of pollution resulting from each category, subcategory or source;
4. An identification and description of state and local programs for controlling pollution added from nonpoint sources to, and improving the quality of, each such portion of the navigable waters,

including but not limited to those programs which are receiving federal assistance under subsections (h) and (I).

Nonpoint Source Pollution Management Program

Section 319(b) requires that the states prepare a Nonpoint Source Management Plan, which includes the following elements: (All references to sections, paragraphs and subparagraphs are from CWA §319.)

1. An identification of best management practices (BMPs) and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory or particular NPS designated under paragraph (1)(B), taking into account the impact of the practice on ground water quality.
2. An identification of programs (including, as appropriate, non-regulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer and demonstration projects) to achieve implementation of the best management practices by categories, subcategories and particular nonpoint sources designated under subsection (A).
3. A schedule containing annual milestones for (a) utilization of the program implementation methods identified in subparagraph (B) and (b) implementation of the best management practices identified in subparagraph (A) by the categories, subcategories or particular nonpoint sources designated under paragraph (1)(B). Such schedule shall provide for utilization of the BMPs at the earliest practicable date.
4. A certification of the attorney general of the state or states (or the chief attorney of any state water pollution control agency which has independent legal counsel) that the laws of the state or states, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program, and a schedule and commitment by the state or states to seek such additional authorities as expeditiously as practicable.
5. Sources of federal and other assistance and funding (other than assistance provided under sections (h) and (I) which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years.
6. An identification of federal financial assistance programs and federal development projects for which the state will review individual assistance applications or development projects for their effect on water quality pursuant to procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372 but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the state's NPS pollution management program.

In 1993, the U.S. Environmental Protection Agency approved Louisiana's Nonpoint Source Assessment Report and Management Plan. During the next seven years, LDEQ worked cooperatively with other federal, state, local agencies, and non-profit organizations to implement the goals and objectives of the 1993 documents. In August 2000, U.S. EPA Region 6 approved the revised NPS Management Plan that addressed the nine key elements that the U.S. EPA required of all states in order to upgrade their programs. These nine key elements have been summarized below.

U.S. EPA's Nine Key Elements

In 1997, U.S. EPA Headquarters issued revised guidance to the states, which described the process that states should utilize to upgrade their Nonpoint Source Management Plans. This revision process would be

based on nine key elements, which U.S. EPA wants to see included in the revised programs. The key elements will more clearly identify the programmatic goals that the states have for reduction of nonpoint source pollution and improvement of water quality. The nine key elements include:

1. The State program contains explicit short- and long-term goals, objectives, and strategies to protect surface and ground water.
2. The State strengthens its working partnerships and linkages with appropriate State, Tribal, regional, and local entities (including conservation districts), private sector groups, citizen groups, and Federal agencies.
3. The State uses a balanced approach that emphasizes both statewide nonpoint source programs and on-the ground management of individual watersheds where waters are impaired and threatened.
4. The State program (a) abates known water quality impairments from nonpoint source pollution and (b) prevents significant threats to water quality from present and future activities.
5. The State program identifies waters and their watersheds impaired by nonpoint source pollution and identify important unimpaired waters that are threatened or otherwise at risk. Furthermore, the State establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans and then by implementing the plans.
6. The State reviews, upgrades, and implements all program components required by §319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable. The State programs include the following:
 - (a) A mix of water quality-based and/or technology-based programs designed to achieve and maintain beneficial uses of water;
 - (b) A mix of regulatory, non-regulatory, financial, and technical assistance as needed to achieve and maintain beneficial uses of water as expeditiously as practicable.
7. The State identifies Federal lands and activities, which are not managed consistently with State nonpoint source program objectives. Where appropriate, the State seeks U.S. EPA assistance to help resolve issues.
8. The State manages and implements its nonpoint source program efficiently and effectively, including necessary financial management.
9. The State periodically reviews and evaluates its nonpoint source management program using environmental and functional measures of success, and revises its nonpoint source assessment and its management program at least every five years.

Watershed Planning and Management

U.S. EPA and the State of Louisiana have agreed that a watershed approach to water quality planning and management is a logical, systematic way to reduce and control nonpoint sources of pollution. Through the watershed planning process, water quality data is analyzed, total maximum daily loads are developed and watershed plans are written for each of the water bodies that have been included on the state's §303(d) list of impaired water bodies. The watershed plan becomes the basis for targeting where within the watershed that §319 funds should be focused to solve the water quality problems that exist. U.S. EPA has outlined a set of elements that they believe comprise a workable watershed plan and LDEQ has utilized this outline as a guide to create watershed plans. The watershed plan includes the following:

1. Identification of geographic extent of the watershed, the measurable water quality goals, and the causes and sources that will need to be controlled to achieve the water quality goals.
2. Description of nonpoint source management measures that will need to be implemented to achieve the load reductions estimated under paragraph (c).
3. An estimate of the load reductions expected for the management measures described under paragraph (b).
4. An estimate of the costs of needed nonpoint source management measures and an identification of sources and amounts of financial and technical assistance that are estimated to be available to implement the management measures.
5. An information/education component that identifies the education and outreach that will be used to implement the plan and the assistance needed from local, state and federal agencies.
6. A schedule for implementing the nonpoint source management measures identified in the plan that is reasonably expeditious and where appropriate, an estimate of the date applicable water quality standards are expected to be attained for each impaired water.
7. A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.
8. An adaptive implementation process that includes a set of criteria that can be used to determine whether nonpoint source loading reductions are being achieved over time and substantial progress is being made towards attaining, or assuring continued attainment of, water quality standards and, if not, the criteria for determining whether the watershed-based plan needs to be revised and, where a NPS TMDL has been established, whether the NPS TMDL needs to be revised or new TMDL need to be developed for waters in the watershed.
9. A monitoring component to determine whether the watershed plan is being implemented and applicable water quality standards are being attained or maintained, as applicable, according to schedule, measured against the criteria established under item (8) immediately above.

Implementation

The primary objective of the Nonpoint Source Management Program is to implement BMPs that will reduce the level of NPS pollution in the surface and ground waters of the state. In addition to BMP implementation, educational programs are held at the local level, in order to educate residents about NPS pollution problems and about BMPs recommended by state and federal agencies to reduce and/or correct these problems. Demonstration projects are also an important component of the implementation process. These projects function as an educational tool through demonstration of the recommended management practice to the general public or landowners regarding a specific NPS problem. These projects also allow LDEQ the opportunity to gather quantitative data and information on the effectiveness of the management practice recommended for reduction of NPS pollution (sediments, nutrients, pesticides, and metals). This evaluation of BMPs is reported back to the interagency committee through a feedback loop that allows continuous adjustment of the management practice recommended for NPS abatement. Through this implementation process, corrective measures to reduce the level of sediments, metals, nutrients, and pesticides entering surface and ground waters of the state have been initiated. For this program to be successful, it will take the continued cooperative efforts of the government agencies that have authority and management responsibilities for state, federal, and private lands within Louisiana. More information on implementation of LDEQ's Nonpoint Source Program can be found in the Nonpoint Source Management Plan and the Annual Report for the program or through the internet at: <http://nonpoint.deq.state.la.us>.

Coordination With Other Agencies

The LDEQ, Office of Environmental Assessment (OEA) coordinates their activities with various other federal, state, and local agencies and organizations. This coordination takes a number of different forms.

As a result of federal grants administered by U.S. EPA, LDEQ must work closely with U.S. EPA personnel to ensure that all obligations and goals of the grants are fulfilled. LDEQ in turn utilizes these grant funds to support its programs and implement nonpoint source management and demonstration projects through a variety of contractors, consultants, citizen groups and university researchers. The Nonpoint Source Program (NPS program), within the Environmental Planning Division, administers many of these projects in an effort to find solutions to nonpoint source pollution in the state. The section entitled Nonpoint Source Control Program in this chapter has details on a variety of activities undertaken by the NPS program.

In addition to LDEQ's NPS Program, LDEQ staff sits on several national, state and regional task forces, committees, and programs. Among these are the Gulf of Mexico Program (GOMP), which is aimed at focusing awareness of the Gulf's pollution, habitat, fisheries, and other problems, and finding workable solutions to them. Another program supported by personnel from LDEQ is the Lower Mississippi River Conservation Committee (LMRCC). Like the GOMP, the LMRCC's goal is to identify and find solutions to problems that exist among states along the lower Mississippi River south of the Ohio River. LDEQ also represents the state on the Coastal Wetlands Conservation and Restoration Task Force and Project Restore. Both groups are state efforts to address coastal land loss. LDEQ also maintains representation on the Lake Pontchartrain Basin Foundation (LPBF) board. The LPBF is charged with seeking solutions to and raising citizen awareness of pollution problems in Lake Pontchartrain and the surrounding watershed. The Southern States Mercury Task force includes personnel from LDEQ. This task force serves as a forum for exchange of information between states concerning the problem of mercury contamination of fish tissue. Finally, LDEQ maintains a seat on the Louisiana Aquatic Invasive Species Task Force. This group was charged with developing a management plan for addressing aquatic invasive species. The task force recently developed pending legislation to create a permanent council and advisory task force for coordination of actions aimed at controlling or preventing the spread of invasive or potentially invasive aquatic species.

Another aspect of coordination between LDEQ and other agencies is in the area of direct field research. For example, OEA is working with the U.S. GS in an effort to link LDEQ's ambient water quality data with stream flow data. Under this arrangement, U.S. GS personnel determine stream flow at selected LDEQ water sample sites. This information is later provided to LDEQ so that stream flow can be included with water quality data. Through this project, LDEQ personnel and other researchers will be able to analyze in-stream loading of water parameters in addition to simple concentrations. The stream flow data is also utilized by OES permit writers in deriving effluent limitations for wastewater discharges.

A final area of coordination involves LDEQ, the Louisiana Department of Health and Hospitals (LDHH), and the Louisiana Department of Wildlife and Fisheries (LDWF) in the setting of fish consumption and swimming advisories. Under this arrangement, water and fish samples are generally collected by LDEQ. Water samples are tested for the presence of fecal coliform bacteria by LDHH laboratories and results shared by LDEQ and LDHH. Fish tissue samples are analyzed by either LDEQ or contract laboratories with results provided to LDHH for risk analysis. After a decision has been reached on the need for fish consumption or swimming advisories, the LDWF is also notified so that informational bulletins can be provided when fishing licenses are purchased. A news release is then prepared describing the advisory, why it was established, and the source of the problem, if known. More information on fish consumption and swimming advisories in Louisiana can be found in Part III, Chapter 7, and on the LDEQ Website at <http://www.deq.state.la.us/>.

Chapter 3: Cost/Benefit Assessment

Cost Information

Due to the reengineering of the LDEQ, responsibility for protecting water quality in Louisiana has now been split into several different multi-media Offices and Divisions within the Department. As a result, it is difficult if not impossible to separate out the costs attributable to water related pollution control efforts. However, the environmental benefits from the environmental resources protected by LDEQ are more important than ever.

A true cost/benefit assessment for the LDEQ is difficult if not impossible to obtain. This is due to the fact that research on the economic value of incremental improvements in water quality is not currently available. While recent economic research has begun to place monetary values on otherwise intangible environmental benefits such as wilderness for non-consumptive recreation, such efforts have not taken place in the area of water quality. In addition to the lack of economic assessments, water quality assessment methodologies presently provide only a "snapshot" look at water quality as directed by §305(b) guidance provided by the EPA. Some effort has been made to compare these biennial assessments in order to determine changes in water quality over time. However, this has been largely unsuccessful due to changes in evaluation protocols. Therefore, in lieu of a formal cost/benefit assessment of water quality improvements, the LDEQ is providing information on pollution abatement capital expenditures and operating costs for Louisiana. And to place these expenditures in perspective, financial information on activities that benefit from this investment is also provided. However, first there is a general discussion of LDEQ funding for water quality protection related activities.

Much of the water quality related budget is self-generated through permit fees and enforcement actions; however, a portion is derived through federal grants. These include the §106 grant for water pollution control activities; the §104 grant for research investigations, training and informational demonstrations, the §319 grant for nonpoint source management issues, and the §604 grant for state water quality management planning activities. Money from each of these grants is divided throughout the water quality related sections as directed by each grant, and provides funding for personnel, equipment, survey and research work, and ambient monitoring. Shown below are a few of the programs and activities supported by each of these grants.

Notable among these grants in its achievements is the §319 grant for nonpoint source management issues. LDEQ continues working with universities, city and parish officials, private industry, and the federal government on over 40 projects that target NPS pollutants from urban runoff, forestry, agriculture, sand and gravel operations, and home sewage systems. Furthermore, there were 1,876 contracts written on 188,833 acres of land in the state to implement U.S. Department of Agriculture (U.S. DA) programs designed to improve environmental quality. This has resulted in more than \$38 million allocated to program implementation within Louisiana. LDEQ continues to work closely with U.S. DA to make progress in reducing nonpoint source pollutants and improving water quality. Part II, Chapter Two, Nonpoint Source Pollution Control has more information on this topic as well as other efforts by the Nonpoint Source Program at LDEQ.

Research monies provided by §104 grants have been very helpful in aiding the LDEQ in assessing the overall quality and ecological characteristics of Louisiana's water bodies. However, this money will run out in October at which time §604 monies will be substituted.

Section 604 grant monies are used to fund survey work on streams not meeting designated uses. These surveys provide data for development of total maximum daily loads (TMDL) and wasteload allocations (WLA). This data assists permit writers in establishing water quality protective effluent limits for dischargers.

Finally, the §106 grant provides funding for the entire water pollution control/water quality management program. Activities funded under the §106 grant include ambient water quality monitoring, assessment of

ambient water quality data, development of the *Water Quality Inventory* (Now known as the Integrated Report), revision of Louisiana's Water Quality Management Plan, development and revision of surface water quality standards, development and issuance of waste water discharge permits, compliance inspections, complaint investigations, and development of enforcement actions.

Data on pollution abatement capital expenditures and operating costs from the Bureau of the Census publication, *Current Industrial Reports*, has been included to provide estimates of the costs to the state and local jurisdictions and to industry related to water quality protection and improvement. For 1999, the most recent year for which data is available, government and industry in Louisiana spent \$105.5 million in capital expenditures to protect water quality. For the same period water quality related operating costs for Louisiana totaled \$211.4 million. This represents a \$316.9 million expenditure for water pollution control related expenses (U.S. Bureau of the Census, 1999).

In an attempt to place these state and industry expenditures in perspective and to provide an approximation of a cost/benefit assessment, information on the size of Louisiana's water resources and its economic benefits to the state, both directly and indirectly, is provided below.

Benefits Information

Louisiana's water resources occupy 3,100 square miles of the total state surface area of 44,521 square miles (LDEQ, 1992b). As a result, the LDEQ is responsible for the protection of 7% of the total surface area of the state. In many instances protection of surface waters also involves the management of storm water runoff from land based activities such as farming, aquaculture and forestry. This greatly increases the effective area for which the LDEQ is either directly or indirectly responsible.

Information provided by the Louisiana Department of Wildlife and Fisheries, (LDWF, 2002), 2001-2002 annual report on commercial fisheries reported that the shrimp fishery is Louisiana's most valuable commercial fisheries. Louisiana leads the nation in shrimp landings with almost 77 million pounds landed in 2001. The dockside value was about \$194 million. Additionally, Louisiana blue crab landings for 2001 totaled 40.6 million pounds and stone crab landings were 24.2 thousand pounds. The state consistently produces one of the largest and most valuable oyster resources in the nation, averaging over 12.5 million pounds per year. The dockside value is nearly \$27.5 million. The total value of commercial landings exceeded \$345 million in 2001. Adjusting for the multiplier effect as the commercial landing fisheries products move through the economy produces an estimated total output value of \$2.967 billion. This industry also generates over 30,000 jobs and produces an estimated \$117 in state tax revenue.

The LDWF also surveyed the licensed recreational fishery in the state. More than 775,000 anglers took over 3.6 million marine recreational fishing trips in 2001. Nearly 12 million spotted sea trout and 6 million red drum were caught in Louisiana. Louisiana saltwater anglers, both resident and non-resident, spent approximately \$410 million for fishing trips, equipment, and other miscellaneous expenses. The total economic impact of marine recreational anglers to Louisiana is approximately \$746 million. However, when unlicensed and non-resident participation in recreational fisheries are included, the total number of anglers increases to 970,000 with direct expenditures of \$842.4 million. After adjusting for the multiplier effect the total economic value becomes \$1.5353 billion. This generates \$56 million in state taxes and creates 16,000 jobs.

Both recreational and commercial fishing have an obvious relationship to Louisiana's water resources. Not so obvious is the connection between hunting/non-consumptive wildlife activities and water resources. Over 168,300 deer hunters participated in hunting activities during the period (LDWF, 2002). There were also 51,300 dove hunters, 5,000 quail hunters, 4,200 woodcock hunters, and 21,000 turkey hunters. Combined licensed and non-licensed hunting participation totaled 333,000 with direct expenditures of \$581.1 million. After adjusting for the multiplier effect the total economic value becomes \$992.5 million. This generates \$30 million in state taxes and creates 9,000 jobs.

An estimated 935,000 participants engaged in wildlife watching resulting in expenditures of \$138.4 million (LDWF, 2002). After adjusting for the multiplier effect the total economic value becomes \$274.8 million, which generates \$11 million in state taxes and creates 4,000 jobs.

While hunting and non-consumptive wildlife activities are not often directly associated with water quality, it must be recognized that terrestrial wildlife and especially waterfowl are dependant on the availability of high quality waters. Further, hunters and non-consumptive users alike are less likely to participate in their preferred activities in areas of questionable water and aesthetic quality. A holistic approach to environmental and resource management requires that consideration be given to all wildlife, both aquatic and terrestrial, because all require clean water for their survival.

Adding the \$2.967 billion in commercial fisheries, the \$1.5353 billion in recreational fishing, the \$992.5 million spent on hunting and the \$274.8 million spent on wildlife-watching, produces a total value to Louisiana's economy of \$5.7696 billion. While this entire total cannot be directly related to water resources, almost all of it can be associated with the need for clean water.

Expressed in rough monetary terms, an investment of \$316.9 million in water quality pollution abatement capital expenditures and operating costs protects a \$5.8 billion industry. This financial outlay amounts to less than 6% of the value of the annual benefits. So it is quite clear that the returns to Louisiana are well worth the costs incurred.

Although the connection is not so direct, clean water is also important to the tourism industry. The Department of Culture, Recreation and Tourism, Office of Tourism Annual Report for Fiscal Year 2002-2003; states that 21.2 million U.S. resident visitors came to Louisiana as did 500,000 international visitors (Louisiana Office of Tourism, 2003). Travel statistics indicate that 17% of resident visitors participated in some sort of outdoor activity during their visit, as did 6% of international visitors. The tourism industry too has an important impact on many local economies.

Tourism resulted in expenditures by U.S. resident visitors of \$8.58 billion and by international visitors of \$450 million. These expenditures generated state taxes of \$405 million. Travel and tourism helped sustain the employment of 120,000 people working in the travel and tourism industry in Louisiana. It also resulted in 15,890,597 hotel/motel room nights sold (Louisiana Office of Tourism, 2003). Although not all of the outdoor recreation is water-based, it can safely be assumed that water quality is a factor in the overall environmental perception of travelers and outdoor recreation represents an important part of Louisiana's tourism industry. Because water quality often plays an important part in this recreation, it is imperative that it be enhanced and protected.

As can be seen, Louisiana invests a great deal of money in its efforts to enhance and maintain water quality in Louisiana. In return, the citizens of Louisiana and visitors to the state derive a number of benefits, both financial and aesthetic, from the state's abundance of water bodies. With the combined efforts of the LDEQ, industry and, most importantly, the citizens of Louisiana, our waters will continue to provide abundant recreational and commercial benefits for everyone.

Chapter 4: Special State Concerns and Recommendations

Summary of Louisiana Mercury Studies

Mercury contamination of fish is a widespread problem throughout much of the United States and the world. In 1992, the first advisory in Louisiana for mercury was issued for a stretch of the Ouachita River from the Arkansas border to the lock and dam at Columbia. Since then, the state legislature has provided funding for a statewide Mercury Program each year. Twenty-nine additional mercury advisories have been posted to date in Louisiana. Through an inter-agency agreement, LDEQ, LDHH and LDWF collaborate to jointly issue each fish consumption advisory. The agencies will *consider* issuing a health advisory limiting fish consumption for pregnant or lactating women and young children for locations where the average concentration of mercury exceeds 0.5 ppm in fish and shellfish. At average concentrations of 1.0 ppm, the agencies will consider recommending no consumption for pregnant or lactating women and young children and limited consumption for the general population.

Methyl mercury is the form of mercury predominantly picked up by fish and stored in muscle tissue. Methylation of inorganic mercury seems to be enhanced by the presence of clear, low pH water. Methylation rates of mercury also tend to be higher in fresh water compared to salt water, and in low oxygen conditions compared to waters with high dissolved oxygen levels. There are numerous potential sources of mercury in Louisiana waters, including atmospheric deposition, natural geologic deposits, industrial/municipal discharges, and previously contaminated sediment. However, atmospheric deposition is the primary source of mercury in Louisiana and much of the nation. Four wet deposition (rainfall) monitors exist in the state to evaluate the concentration of mercury found in rainfall events. U.S. EPA is in the process of proposing regulations to control mercury emissions from coal and oil-fired power plants (one of the primary sources of atmospherically deposited mercury). Final regulations are expected to be released on December 15, 2004.

Inorganic mercury in water bodies is primarily bound to sediments, with little mercury found in water (Beckvar et al., 1994). The presence of mercury in sediments of a water body is not alone sufficient to produce a contamination problem in fish. Water conditions must also be conducive to methylation of inorganic mercury for significant accumulations to occur. As part of the mercury program funded by the state legislature, LDEQ has offered grant money for various studies relating to the mercury problem. Currently, research into factors that promote the uptake of mercury into the aquatic food chain has been re-directed to provide data on mercury levels and distribution in state surface water sediments.

LDHH is also conducting surveys of sensitive populations, which include testing for mercury levels in the blood. The first screening of 77 individuals in 1998 identified elevated mercury blood levels in some people who regularly consume fish from advisory water bodies in Morehouse, Ouachita, and Union parishes. Since then, more than 300 additional volunteers have been tested. LDHH advises those with elevated blood mercury levels to lower their consumption of fish from contaminated waters and offers a second free testing to check for reduced levels of mercury.

As part of the mercury study program, LDEQ has maintained a regular mercury monitoring program since its initiation in 1994. Approximately \$300,000 in state general funds is used for sample collection, analysis, and management of mercury data. As of December 2003, 504 sites on 298 water bodies were sampled. Most sites are now sampled on a three-year rotating basis (approximately one hundred sites are sampled per year). The advisory sites are sampled once per year with the exception of Henderson Lake, which is sampled once per quarter in an effort to detect seasonal trends in mercury concentration. LDEQ will continue to coordinate with LDHH in assessing data derived from this study in order to determine the need for health advisories. For more information, please visit the LDEQ Website at <http://www.deq.state.la.us/surveillance>. To help the public better understand mercury issues, a non-technical report has been developed and will be published annually and made available free of charge. The current document may be viewed at the website (above) or a hardcopy may be requested by calling (225) 219-3168.